are three sampling loops initiated. In the first sampling loop, the outboard sensors in the head are sampled to determine their positions. These positions are determined by mathematical logic showing the difference in their axial positions (X being horizontal, Y being vertical).

In blade position update, the numerical values of X and Y having been determined, the blades are positioned based on the differences of the X and Y coordinates and the relative angle of fill required to bring the joint to level.

During the automatic update of the sensors, the microprocessor MP2 determines whether or not the blades **211'** and **215'** are in the position to allow the correct passage of the compound over the blades. This means that the crown of the two finishing blades **211'** and **215'** is equal through the center and end-to-end thereby being neutral.

In the second sampling loop, the inboard sensors are sampled to determine their relative heights. If the inboard sensors are reading lower in position than the outboard sensors, then there is a required motor correction to bring the blades to neutral. In this correction there are eight determined relationships examined. These X, and Y values that are fed to microprocessor MP2 are relative positions of the two blades in each head. For instance, in the flat head, the 7"blade is considered to be the primary leading blade and the **10"**, or the wider blade, is the secondary trailing blade. If these two blades are not pre-crowned correctly, then the trailing blade will remove the compound as it passes the primary blades path. To correct these types of errors, the auto function program is set up to cause each blade to be crowned correctly in relation to the wall. The X and Y values are parabolic gradients. Since the two blades are always crowned either up or down, the program runs two separate loops to determine whether the X value (horizontal relationship) is correct with regards to the Y axis (vertical relationship). This is accomplished by means of the sensors. Each sensor sends to the analog/digital converter a voltage that indicates (along a spectrum of −5 volts to 0 to +5 volts DC) whether or not the sensor quadrant is indicating a low reading (−5 volts DC to 0) indicating a fill requirement or indicating a high reading (0 to +5 volts DC) indicating a removal of excess compound. In FIGS. **18, 21-22**, the motor correction sequences are illustrated:

X=Y blades are in neutral position this means that the blades will allow free passage of the compound to the wall surface without interference except to cut the excess compound from the edges of the path. The blades are ½of a degree off in terms of total arc.

X<Y blades are in a concave position relative to the face of the wall. It is in this position the most compound will be left in the center of the joint. The edges however must remain tightly crued so that blades must assume a radical parabolic curve in order to accomplish this. It is under this condition that the heaviest rpm spin to correction occurs.

X>Y occurs as a result of the sensors indicating one side of the joint being higher than the other side. The correction to spin occurs in a manner so as to stagger the relationship of the primary blade and the secondary blade parabolic attitude. This allows more compound to be passed over the low part of the joint while simultaneously removing compound from the high side of the joint.

(x).Y occurs as a result of the sensors indicating the center part of the joint being higher than the outer areas (**10"** perimeter). The motor correction to spin allows the blades to assume a rippled appearance in relationship to the wall so as to allow the excess compound under the tape to be imbedded further into the wall. This will allow an artificial center to occur, thereby effectively shifting the center of the joint either left or right.

X.(Y) is the opposite of (X.Y) in that it leaves more compound under the tape than in normal situations.

X+Y, X−Y these occur as a result of manual function options which simplify X, Y values to single blade manipulation allowing the operator to choose the blade up function which is X+Y or blades down with is X−Y.

The CLEAR ACCUMULATOR order (FIGS. **21-22**) occurs at the beginning of the program sequence in order to set the relative blade and sensor positions in order to start reading the wall surface. If any of the sensors or blades are not operating correctly (overload voltages occurring at any relay points, etc. would indicate either a blade or sensor stuck in position) an audible alarm will sound. The order itself will place everything in a begin reading sequence.

Go mode initiated means simply that the tool has been placed against the wall and relayed information to TOP COM(MP2) causes all tasks performed to be of the priority rating. Go to set function means simply that all sampling routines have begun their set sequence the set routine is sample all sensors outboard to inboard sample all blade position sensors sample all pump sensors average all tape counting sequences and all priority encoder sequences.

Run program occurs when the tool is placed on the wall and drawn along the wall thereby causing input information along the input network to be received at TOP COM(MP1) and acted upon. The microprocessor MP2 initiates cycle **1** sequence meaning that all input information runs in terms of priority. In FIG. **21**, cycle **1** is the autofunction **1** program.

Blade control sequence refers to the incoming voltage from TOP COM(MP2) to cause the motors to spin according to a timing sequence which allows them to operate only long enough to correct the crown in the blades based on the incoming information from the sensors.

Jump subroutine occurs in the program for a variety of reasons. For example, if a leak occurs in any of the fluid carrying hoses causing a massive drop in pressure at the head chambers, TOP COM(MP2) will receive PIV at input G causing immediate shut down of all pumping systems. Another jump subroutine would occur if the heads were improperly attached to the control handle effectively shutting off all instructions to the TOP COM shutting the unit down completely.

Function select indicators are autofunction **1, 2** or **3**. The tool is in autofunction **1** when the autofunction **1** switch is turned on, etc. Autofunction **1** go to go code **0010**, autofunction **2** go to go code **0100**. autofunction **3** is **0001**. This simply puts TOP COM(MP2) in a routine tasks performance mode.

In the indirect register address all the various subroutines are contained to be used as a comparator for TOP COMs(MP2) input instruction data. This way the computer knows what subroutine task must be performed in order to correct or compensate for prevailing conditions.